The ITSG-Grace2014 Gravity Field Model

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The ITSG-Grace2014 GRACE-only gravity field model consists of a high resolution unconstrained static model (up to degree 200) with trend and annual signal, monthly unconstrained solutions with different spatial resolutions as well as daily snapshots derived by using a Kalman smoother. Apart from the estimated spherical harmonic coefficients, full variance-covariance matrices for the monthly solutions and the static gravity field component are provided.

Compared to the previous release, multiple improvements in the processing chain are implemented: updated background models, better ionospheric modeling for GPS observations, an improved satellite attitude by combination of star camera and angular accelerations, estimation of K-band antenna center variations within the gravity field recovery process as well as error covariance function determination. Furthermore, daily gravity field variations have been modeled in the adjustment process to reduce errors caused by temporal leakage. This combined estimation of daily gravity variations field variations together with the static gravity field component represents a computational challenge due to the significantly increased parameter count. The modeling of daily variations up to a spherical harmonic degree of 40 for the whole GRACE observation period results in a system of linear equations with over 6 million unknown gravity field parameters. A least squares adjustment of this size is not solvable in a sensible time frame, therefore measures to reduce the problem size have to be taken.

The ITSG-Grace2014 release is presented and selected parts of the processing chain and their effect on the estimated gravity field solutions are discussed.